

1 **Supplemental Material: Benefits of Deterministic and Stochastic Tendency**
2 **Adjustments in a Climate Model**

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9 Additional Tables.

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]		
		%	RMSE	5th/95th									
ANN	Land	3.97%	1.07	1.06 1.08	17.04%	0.9	0.9	4.60%	1.06	1.05 1.07	20.65%	0.88	0.88 0.89
	Ocean	-1.67%	0.79	0.78 0.81	0.26%	0.8	0.8	-0.77%	0.78	0.78 0.80	-1.16%	0.79	0.78 0.81
	Tropics	1.79%	1.15	1.14 1.17	8.53%	1.1	1.1	1.54%	1.15	1.15 1.17	9.47%	1.06	1.05 1.08
	Extra Tropics	-1.32%	0.61	0.61 0.62	6.11%	0.6	0.6	2.15%	0.59	0.59 0.60	6.44%	0.57	0.56 0.58
	Global	1.01%	0.89	0.88 0.90	7.93%	0.8	0.8	1.79%	0.88	0.88 0.89	8.72%	0.82	0.81 0.83
		P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]		
ANN	Land	1.77%	1.11	1.10 1.13	13.52%	0.98	0.97	3.53%	1.09	1.08 1.11	15.28%	0.96	0.96 0.97
	Ocean	-16.81%	1.07	1.06 1.09	9.72%	0.83	0.82	0.11%	0.92	0.90 0.93	9.28%	0.83	0.82 0.85
	Tropics	-10.14%	1.54	1.52 1.57	11.78%	1.24	1.22	1.50%	1.38	1.36 1.40	12.42%	1.23	1.21 1.25
	Extra Tropics	-6.00%	0.51	0.51 0.52	7.87%	0.45	0.44	1.45%	0.48	0.47 0.49	7.45%	0.45	0.44 0.46
	Global	-9.61%	1.08	1.07 1.10	11.22%	0.88	0.87	1.52%	0.97	0.97 0.99	11.73%	0.87	0.87 0.89
		T2m [C]			T2m [C]			T2m [C]			T2m [C]		
ANN	Land	15.09%	1.37	1.35 1.40	16.64%	1.35	1.34	3.15%	1.57	1.55 1.59	16.26%	1.35	1.34 1.37
	Tropics	11.27%	1.23	1.21 1.25	13.95%	1.19	1.18	0.51%	1.38	1.36 1.40	13.15%	1.20	1.19 1.22
	Extra Tropics	16.51%	1.45	1.42 1.48	17.61%	1.43	1.41	4.14%	1.67	1.64 1.70	17.49%	1.43	1.41 1.46
	Global												
		PSL [Pa]			PSL [Pa]			PSL [Pa]			PSL [Pa]		
ANN	Land	37.98%	137.5	134.8 141.8	34.06%	146.2	140.9	11.36%	196.5	188.0 206.2	39.40%	134.3	128.6 141.0
	Ocean	22.78%	163.5	159.8 168.0	51.40%	102.9	97.6 111.0	5.17%	200.8	192.9 209.3	57.27%	90.5	84.8 97.9
	Tropics	-8.49%	73.5	70.8 76.3	23.50%	51.8	50.0 53.8	2.76%	65.9	64.9 67.1	20.72%	53.7	52.4 55.3
	Extra Tropics	29.52%	196.3	192.5 201.7	46.18%	149.9	143.0 159.6	7.39%	258.0	247.9 270.4	52.37%	132.7	125.6 141.9
	Global	27.49%	155.8	152.7 159.9	45.01%	118.2	112.9 125.1	7.19%	199.4	192.0 208.6	50.60%	106.2	101.0 112.8
		TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]		
ANN	Land	7.31%	0.74	0.74 0.74	17.90%	0.65	0.65 0.66	1.26%	0.79	0.78 0.79	17.64%	0.66	0.65 0.66
	Ocean	26.32%	0.14	0.14 0.14	52.55%	0.09	0.09 0.10	6.34%	0.18	0.17 0.19	56.54%	0.08	0.08 0.09
	Tropics	32.33%	0.08	0.08 0.09	51.71%	0.06	0.06 0.06	1.18%	0.12	0.12 0.13	49.64%	0.06	0.06 0.06
	Extra Tropics	24.90%	0.17	0.17 0.18	52.76%	0.11	0.12 0.12	7.65%	0.21	0.20 0.22	58.41%	0.10	0.09 0.10
	Global	9.21%	0.43	0.43 0.43	20.97%	0.37	0.37 0.38	1.80%	0.46	0.46 0.47	20.98%	0.37	0.37 0.38

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]		
		%	RMSE	5th/95th									
DJF	Land	17.79%	1.17	1.16	21.31%	1.12	1.10	3.09%	1.38	1.36	25.39%	1.06	1.05
	Ocean	16.67%	0.87	0.86	12.91%	0.90	0.88	-2.22%	1.06	1.04	13.68%	0.90	0.88
	Tropics	19.68%	1.27	1.26	16.85%	1.32	1.28	-0.82%	1.60	1.58	19.18%	1.28	1.25
	Extra Tropics	8.87%	0.67	0.66	16.78%	0.61	0.61	4.23%	0.70	0.70	18.69%	0.60	0.59
	Global	17.23%	0.98	0.97	16.89%	0.98	0.96	0.34%	1.17	1.16	19.10%	0.95	0.94
		P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]		
DJF	Land	8.90%	1.32	1.30	18.41%	1.18	1.17	2.28%	1.42	1.40	21.10%	1.14	1.13
	Ocean	2.57%	1.18	1.16	11.19%	1.07	1.05	-1.16%	1.22	1.21	10.45%	1.08	1.06
	Tropics	5.05%	1.73	1.71	12.63%	1.59	1.57	-0.49%	1.83	1.81	13.40%	1.58	1.55
	Extra Tropics	5.39%	0.61	0.61	23.42%	0.50	0.50	4.93%	0.62	0.61	22.80%	0.50	0.50
	Global	5.11%	1.23	1.21	14.10%	1.11	1.10	0.23%	1.29	1.28	14.72%	1.10	1.09
		T2m [C]			T2m [C]			T2m [C]			T2m [C]		
DJF	Land	8.14%	2.31	2.26	12.87%	2.194	2.147	1.15%	2.489	2.419	12.83%	2.20	2.14
	Tropics	14.88%	1.59	1.55	21.09%	1.474	1.446	1.66%	1.837	1.796	17.77%	1.54	1.50
	Extra Tropics	6.50%	2.65	2.72	10.89%	2.521	2.599	1.03%	2.8	2.714	11.63%	2.50	2.43
		PSL [Pa]			PSL [Pa]			PSL [Pa]			PSL [Pa]		
DJF	Land	31.78%	159.9	155.8	24.70%	176.4	166.7	7.33%	217.2	208.0	36.63%	148.5	142.5
	Ocean	34.77%	146.4	139.6	41.43%	131.5	125.3	1.01%	222.2	231.0	51.22%	109.5	161.0
	Tropics	18.43%	93.9	99.1	24.24%	87.2	91.3	-0.97%	116.3	210.5	235.9	123.3	104.0
	Extra Tropics	35.85%	182.6	176.8	36.60%	180.5	170.5	3.69%	274.2	145.0	259.7	138.0	84.5
	Global	33.71%	151.0	159.57	35.13%	147.8	140.5	3.16%	220.6	220.6	210.1	123.7	118.5
		TauX [N/m2]			TauX [N/m2]			TauX [N/m2]			TauX [N/m2]		
DJF	Land	7.27%	0.83	0.82	17.17%	0.74	0.73	-0.80%	0.90	0.89	18.39%	0.73	0.72
	Ocean	31.70%	0.15	0.14	49.42%	0.11	0.10	-3.38%	0.22	0.91	52.94%	0.10	0.10
	Tropics	48.11%	0.09	—	45.75%	0.09	—	-3.15%	0.17	0.21	42.88%	0.10	0.11
	Extra Tropics	26.26%	0.19	0.18	50.68%	0.13	0.12	-3.57%	0.26	0.28	56.80%	0.11	0.11
	Global	31.36%	0.15	0.15	49.32%	0.11	0.11	-3.46%	0.23	0.22	52.72%	0.10	0.10

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
JJA	Land	5.44%	1.53	1.51 1.56	16.80%	1.35	1.34 1.37	5.00%	1.54	1.53	16.37%	1.35	1.34 1.37
	Ocean	-2.59%	1.31	1.29 1.33	-0.86%	1.28	1.27 1.31	-0.63%	1.28	1.26 1.31	-3.93%	1.32	1.31 1.35
	Tropics	0.34%	1.76	1.74 1.79	2.38%	1.72	1.70 1.76	1.70%	1.74	1.72 1.77	-0.45%	1.77	1.75 1.82
	Extra Tropics	2.23%	1.01	1.00 1.03	16.55%	0.86	0.86 0.88	2.23%	1.01	1.00 1.03	16.46%	0.86	0.85 0.88
	Global	0.86%	1.38	1.37 1.41	6.52%	1.31	1.29 1.33	1.86%	1.37	1.36 1.39	4.51%	1.33	1.32 1.36
JJA	P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]			
	Land	7.08%	1.61	1.59 1.64	14.80%	1.48	1.47 1.50	3.68%	1.67	1.66 1.70	14.34%	1.49	1.48 1.51
	Ocean	-12.32%	1.36	1.34 1.38	10.75%	1.08	1.07 1.11	2.89%	1.17	1.16 1.20	8.68%	1.10	1.09 1.13
	Tropics	-4.67%	2.02	2.00 2.05	12.29%	1.69	1.67 1.72	3.58%	1.86	1.85 1.88	10.89%	1.72	1.75 1.77
	Extra Tropics	4.21%	0.77	0.76 0.80	14.85%	0.69	0.68 0.71	1.98%	0.79	0.79 0.81	13.86%	0.70	0.69 0.71
JJA	Global	-3.06%	1.45	1.43 1.47	12.75%	1.23	1.21 1.25	3.28%	1.36	1.35 1.38	11.47%	1.24	1.23 1.27
	T2m [C]			T2m [C]			T2m [C]			T2m [C]			
	Land	11.27%	1.84	1.81 1.86	9.43%	1.87	1.85 1.90	1.21%	2.04	2.02 2.07	1.21%	2.04	2.02 2.07
	Tropics	6.59%	1.40	1.39 1.42	6.85%	1.40	1.39 1.41	2.79%	1.46	1.45 1.48	2.79%	1.46	1.45 1.48
	Extra Tropics	12.42%	2.05	2.02 2.08	10.11%	2.10	2.07 2.14	0.86%	2.32	2.29 2.35	0.86%	2.32	2.29 2.35
JJA	PSL [Pa]			PSL [Pa]			PSL [Pa]			PSL [Pa]			
	Land	36.43%	186.042	181.93 193.521	30.97%	202.0	193.1 212.8	0.67%	290.7	273.6 311.0	24.30%	221.5	212.2 233.2
	Ocean	24.83%	180.6	173.67 190.971	32.10%	163.2	155.7 174.4	-2.76%	246.9	236.7 260.6	26.78%	175.9	169.7 184.1
	Tropics	2.64%	85.27	83.394 87.696	-20.86%	105.9	103.0 109.2	-5.26%	92.2	89.7 95.5	-29.03%	113.0	109.8 116.5
	Extra Tropics	31.15%	230.045	223.217 242.279	35.50%	215.5	205.7 229.0	-1.12%	337.9	321.6 359.3	29.72%	234.8	225.7 247.0
JJA	Global	29.47%	182.414	177.431 191.184	31.62%	176.9	169.9 186.5	-1.33%	262.1	249.9 278.0	25.73%	192.1	185.4 200.6
	TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]			
	Land	15.73%	0.95	0.94 0.96	27.64%	0.82	0.81 0.83	1.13%	1.12	1.11 1.13	25.86%	0.84	0.83 0.85
	Ocean	22.03%	0.17	0.16 0.18	34.93%	0.14	0.13 0.15	0.18%	0.22	0.21 0.23	28.00%	0.16	0.15 0.17
	Tropics	20.74%	0.15	— —	40.85%	0.11	— —	-4.50%	0.20	— —	35.50%	0.12	— —
JJA	Extra Tropics	22.74%	0.19	0.18 0.21	32.00%	0.17	0.16 0.18	2.57%	0.24	0.22 0.25	24.94%	0.18	0.18 0.20
	Global	22.07%	0.17	0.17 0.18	34.82%	0.14	0.14 0.15	0.15%	0.22	0.21 0.23	28.29%	0.16	0.15 0.17

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]		
		%	RMSE	5th/95th									
MAM	Land	1.71%	1.20	1.19	6.45%	1.15	1.14	3.51%	1.18	1.17	10.37%	1.10	1.09
	Ocean	2.16%	0.91	0.89	10.79%	0.83	0.82	4.31%	0.89	0.92	8.52%	0.85	0.83
	Tropics	4.14%	1.32	1.30	15.03%	1.17	1.16	5.16%	1.31	1.29	15.76%	1.16	1.14
	Extra Tropics	-4.80%	0.70	0.69	-9.15%	0.73	0.72	0.00%	0.67	0.66	-8.70%	0.73	0.71
	Global	1.93%	1.01	1.01	8.70%	0.94	0.94	3.87%	0.99	0.99	9.38%	0.94	0.93
		P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]		
MAM	Land	-1.59%	1.28	1.27	6.52%	1.18	1.17	2.86%	1.22	1.21	9.54%	1.14	1.13
	Ocean	-5.98%	1.29	1.28	15.97%	1.03	1.01	3.36%	1.18	1.17	16.46%	1.02	1.01
	Tropics	-3.94%	1.85	1.83	14.86%	1.51	1.50	3.55%	1.71	1.69	16.32%	1.49	1.47
	Extra Tropics	-9.01%	0.58	0.58	-3.94%	0.55	0.55	0.19%	0.53	0.53	-3.38%	0.55	0.55
	Global	-4.54%	1.29	1.31	12.65%	1.08	1.07	3.16%	1.19	1.18	14.03%	1.06	1.05
		T2m [C]			T2m [C]			T2m [C]			T2m [C]		
MAM	Land	3.29%	1.74	1.72	6.46%	1.68	1.66	2.84%	1.74	1.72	5.46%	1.70	1.68
	Tropics	2.30%	1.40	1.36	4.39%	1.37	1.34	-2.30%	1.47	1.44	6.07%	1.35	1.32
	Extra Tropics	3.55%	1.90	1.94	7.04%	1.84	1.82	4.41%	1.89	1.86	5.22%	1.87	1.85
		PSL [Pa]			PSL [Pa]			PSL [Pa]			PSL [Pa]		
	Land	26.04%	183.6	177.1	23.23%	190.5	181.3	6.06%	233.2	222.8	34.13%	163.5	156.5
	Ocean	6.36%	200.0	192.6	36.88%	134.8	127.3	-1.86%	217.5	208.9	45.12%	117.2	111.6
MAM	Tropics	-0.62%	69.1	72.1	5.58%	64.9	62.4	0.83%	68.1	66.0	13.08%	59.7	57.8
	Extra Tropics	14.29%	250.9	241.8	32.40%	197.9	187.5	1.23%	289.2	277.6	41.93%	170.0	163.4
	Global	13.65%	194.7	188.4	31.13%	155.3	147.9	1.21%	222.8	214.2	40.51%	134.2	129.2
		TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]		
	Land	1.43%	0.77	0.77	10.49%	0.70	0.70	-0.71%	0.79	0.78	10.20%	0.70	0.70
	Ocean	26.48%	0.14	0.14	46.15%	0.11	0.10	3.16%	0.19	0.18	50.62%	0.10	0.09
MAM	Tropics	29.04%	0.08	—	45.87%	0.06	—	2.79%	0.11	—	44.41%	0.06	—
	Extra Tropics	25.48%	0.19	0.18		0.14	0.13	3.02%	0.24	0.23	50.78%	0.12	0.12
	Global	26.00%	0.15	0.14	45.36%	0.11	0.10	2.98%	0.19	0.19	49.78%	0.10	0.10
		0.16			0.12			0.20			0.11		

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]			P-GPCP [mm/day]		
		%	RMSE	5th/95th									
SON	Land	5.53%	1.40	1.38	32.35%	1.00	0.99	9.10%	1.35	1.33	35.92%	0.95	0.94
	Ocean	-0.28%	1.06	1.04	10.43%	0.95	0.93	7.20%	0.98	0.97	11.37%	0.94	0.97
	Tropics	1.97%	1.65	1.61	23.47%	1.29	1.27	8.70%	1.53	1.51	25.79%	1.25	1.22
	Extra Tropics	5.36%	0.64	0.63	7.44%	0.62	0.61	5.65%	0.63	0.63	8.18%	0.62	0.61
	Global	2.56%	1.18	1.16	20.45%	0.97	0.95	8.16%	1.11	1.10	22.51%	0.94	0.93
		P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]			P-ERAi [mm/day]		
SON	Land	3.92%	1.40	1.37	26.20%	1.07	1.06	9.49%	1.32	1.29	27.58%	1.05	1.04
	Ocean	-13.21%	1.39	1.37	21.29%	0.97	0.96	5.55%	1.16	1.35	21.86%	0.96	0.95
	Tropics	-6.92%	2.03	1.99	24.71%	1.43	1.41	7.29%	1.76	1.73	26.08%	1.40	1.39
	Extra Tropics	-2.64%	0.55	0.54	10.73%	0.47	0.47	5.84%	0.50	0.50	7.72%	0.49	0.49
	Global	-6.59%	1.39	1.37	23.22%	1.00	0.99	7.13%	1.21	1.20	24.14%	0.99	0.99
		T2m [C]			T2m [C]			T2m [C]			T2m [C]		
SON	Land	17.76%	1.48	1.46	11.32%	1.60	1.56	2.94%	1.75	1.72	11.76%	1.6	1.6
	Tropics	16.52%	1.24	1.23	12.68%	1.30	1.28	0.00%	1.48	1.45	11.06%	1.3	1.3
	Extra Tropics	18.22%	1.61	1.57	10.89%	1.75	1.70	3.97%	1.89	1.85	12.06%	1.7	1.7
		PSL [Pa]			PSL [Pa]			PSL [Pa]			PSL [Pa]		
SON	Land	29.71%	155.9	152.5	32.85%	148.9	140.1	20.39%	176.6	166.6	34.73%	144.7	139.0
	Ocean	14.65%	197.0	190.4	44.55%	128.0	119.9	19.05%	186.9	188.7	50.14%	115.1	154.0
	Tropics	-11.32%	96.1	92.6	39.02%	52.7	51.4	5.72%	81.4	177.3	20.45%	232.7	108.4
	Extra Tropics	21.44%	229.8	222.5	40.78%	173.2	162.7	20.45%	220.3	199.4	45.57%	159.2	126.6
	Global	19.03%	184.5	179.4	40.67%	135.2	127.6	19.46%	183.6	174.9	44.89%	125.6	54.6
		TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]			TauX [N/m ²]		
SON	Land	8.58%	0.79	0.79	20.95%	0.69	0.68	3.66%	0.84	0.83	19.24%	0.70	0.70
	Ocean	12.47%	0.18	0.17	43.82%	0.11	0.11	19.49%	0.16	0.16	49.92%	0.10	0.10
	Tropics	25.07%	0.11	—	52.16%	0.07	—	9.23%	0.13	—	49.35%	0.07	—
	Extra Tropics	9.54%	0.22	0.21	41.25%	0.14	0.13	21.12%	0.19	0.18	48.79%	0.13	0.12
	Global	12.69%	0.18	0.17	43.45%	0.12	0.11	18.37%	0.17	0.16	48.91%	0.10	0.10

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15 *Table S1. Percent improvement over the Cntrl Simulation (green is positive, red is negative),*
16 *RMSE over land, ocean, in the tropics (25°S-25°N), in the extratropics (90°S-25°S, 25°N-*
17 *90°N), and globally, and bootstrapped 5th/95th confidence intervals of RMSE in annual*
18 *(ANN), DJF, JJA, MAM, SON, for precipitation measured against the NOAA GPCP (P-*
19 *GPCP), precipitation measured against the ERAi (P-ERAi), two-meter temperature (T2m,*
20 *only over land), sea-level pressure (PSL) and zonal wind stress (TauX), in each experiment.*

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
ANN	Tropics	36.41%	1.94	1.89	26.17%	2.25	2.14	3.28%	2.95	2.89	17.91%	2.50	2.40
	Extra Tropics	23.32%	2.27	2.21	42.79%	1.70	1.62	0.71%	2.94	3.02	2.85	1.79	2.62
	Global	28.83%	2.14	2.09	34.87%	1.95	1.88	1.83%	2.95	2.88	30.72%	2.12	1.71
										3.03	29.20%	2.21	1.90
													2.05
													2.21
		U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]		
ANN	Tropics	37.66%	0.94	0.92	57.38%	0.64	0.62	3.57%	1.46	1.43	53.08%	0.71	0.69
	Extra Tropics	26.78%	1.05	1.02	48.61%	0.74	0.71	4.32%	1.37	1.33	52.23%	0.69	0.66
	Global	31.68%	1.00	0.98	52.52%	0.70	0.67	3.95%	1.41	1.38	52.59%	0.70	0.68
										1.45			0.73
		V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]		
ANN	Tropics	3.56%	1.25	1.22	38.13%	0.80	0.78	2.71%	1.258	1.239	33.33%	0.86	0.83
	Extra Tropics	20.69%	0.85	0.81	38.77%	0.66	0.64	2.14%	1.05	1.026	39.61%	0.65	0.63
	Global	11.34%	1.04	1.02	38.45%	0.72	0.71	2.47%	1.144	1.129	36.32%	0.75	0.70
										1.178			0.79
		T850 hPa [C]			T850 hPa [C]			T850 hPa [C]			T850 hPa [C]		
ANN	Tropics	-4.19%	1.52	1.49	-1.65%	1.48	1.46	2.34%	1.42	1.41	2.89%	1.41	1.39
	Extra Tropics	-4.18%	1.64	1.63	8.17%	1.45	1.43	7.35%	1.46	1.45	12.04%	1.39	1.38
	Global	-4.13%	1.59	1.57	4.13%	1.46	1.45	5.31%	1.44	1.43	8.26%	1.40	1.39
													1.42
		Q975 hPa [g/kg]			Q975 hPa [g/kg]			Q975 hPa [g/kg]			Q975 hPa [g/kg]		
ANN	Tropics	9.03%	7.2	7.1	4.61%	7.57	7.34	0.37%	7.90	7.70	5.56%	7.49	7.25
	Extra Tropics	-3.19%	6.7	6.5	-3.57%	6.69	6.53	0.60%	6.42	6.35	-2.20%	6.60	6.47
	Global	3.26%	6.9	6.8	0.80%	7.09	6.91	0.46%	7.11	7.00	1.94%	7.01	6.84
										7.13			7.05

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		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
DJF	Tropics	36.38%	2.96	2.85	47.01%	2.47	2.20	3.57%	4.49	4.36	45.44%	2.54	2.32
	Extra Tropics	26.71%	2.67	2.58	44.68%	2.01	1.92	-1.35%	3.69	3.58	49.77%	1.83	1.75
	Global	31.90%	2.80	2.72	45.95%	2.22	2.08	1.34%	4.05	3.96	47.33%	2.16	2.04
										4.20			2.37
		U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]		
DJF	Tropics	43.82%	1.24	1.18	51.14%	1.08	1.00	2.73%	2.14	2.09	50.23%	1.10	1.03
	Extra Tropics	29.59%	1.18	1.13	46.62%	0.89	0.85	-1.91%	1.71	1.64	55.35%	0.75	0.72
	Global	37.49%	1.20	1.17	49.22%	0.98	0.94	0.78%	1.91	1.86	52.28%	0.92	0.88
										1.97			
		V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]		
DJF	Tropics	8.68%	1.8	1.8	33%	1.33	1.26	-0.65%	2.02	1.96	29.69%	1.409	1.35
	Extra Tropics	17.14%	1.3	1.3	43%	0.93	0.91	0.00%	1.62	1.57	37.44%	1.011	0.972
	Global	12.49%	1.6	1.5	38%	1.12	1.09	-0.33%	1.80	1.76	33.17%	1.199	1.169
										1.89			1.289
		T 850mb [C]			T 850mb [C]			T 850mb [C]			T 850mb [C]		
DJF	Tropics	1.54%	1.66	1.64	2.67%	1.64	1.63	2.73%	1.64	1.62	5.57%	1.59	1.57
	Extra Tropics	-11.50%	1.56	1.54	6.86%	1.30	1.28	0.50%	1.39	1.37	12.93%	1.22	1.20
	Global	-4.69%	1.61	1.59	4.56%	1.47	1.45	1.69%	1.51	1.50	8.86%	1.40	1.39
										1.53			1.42
		Q 975 hPa [g/kg]			Q 975 hPa [g/kg]			Q 975 hPa [g/kg]			Q 975 hPa [g/kg]		
DJF	Tropics	12.51%	4.41	4.31	9.53%	4.56	4.49	2.84%	4.89	4.79	8.95%	4.59	4.51
	Extra Tropics	17.50%	3.54	3.47	29.83%	3.01	2.96	1.19%	4.24	4.13	31.04%	2.96	2.91
	Global	14.63%	3.99	3.93	17.41%	3.86	3.82	2.10%	4.58	4.49	17.52%	3.86	3.80
										4.70			3.95

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		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]		
		%	RMSE	5th/95th									
JJA	Tropics	31.29%	2.56	2.50	-9.06%	4.07	3.88	-2.63%	3.83	3.73	-18.61%	4.42	4.23
	Extra Tropics	29.32%	2.96	2.86	41.56%	2.45	2.38	-0.48%	4.21	4.10	32.90%	2.81	2.74
	Global	30.05%	2.80	2.72	18.83%	3.25	3.14	-1.28%	4.05	3.95	10.10%	3.60	3.49
		U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]		
	Tropics	26.30%	1.49	1.46	37.05%	1.27	1.23	-1.54%	2.05	2.01	28.93%	1.44	1.38
	Extra Tropics	29.12%	1.18	1.14	42.60%	0.96	0.92	1.44%	1.65	1.59	35.29%	1.08	1.05
	Global	27.55%	1.33	1.31	39.50%	1.11	1.08	-0.22%	1.84	1.80	31.75%	1.25	1.22
		V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]		
	Tropics	-5.37%	1.67	1.63	1.96%	1.55	1.51	1.52%	1.56	1.53	-5.50%	1.67	1.63
JJA	Extra Tropics	14.79%	1.26	1.21	14.18%	1.27	1.22	-1.22%	1.50	1.47	19.38%	1.19	1.16
	Global	4.98%	1.45	1.42	8.39%	1.40	1.37	0.13%	1.52	1.50	7.08%	1.42	1.40
		T850 hPa [C]			T850 hPa [C]			T850 hPa [C]			T850 hPa [C]		
	Tropics	-2.13%	1.54	1.52	-0.73%	1.52	1.50	3.65%	1.45	1.44	2.99%	1.46	1.45
	Extra Tropics	0.28%	1.77	1.75	7.67%	1.64	1.62	3.84%	1.71	1.69	8.86%	1.62	1.60
	Global	-0.66%	1.67	1.66	4.46%	1.58	1.57	3.74%	1.60	1.58	6.63%	1.55	1.54
		Q975 hPa [g/kg]			Q975 hPa [g/kg]			Q975 hPa [g/kg]			Q975 hPa [g/kg]		
	Tropics	5.53%	6.19	6.09	11.48%	5.80	5.71	-0.14%	6.56	6.45	11.77%	5.78	5.68
	Extra Tropics	10.77%	4.77	4.70	17.54%	4.41	4.34	-3.18%	5.52	5.42	15.55%	4.52	4.45
	Global	7.72%	5.51	5.45	13.86%	5.15	5.08	-1.46%	6.06	5.96	13.29%	5.18	5.12

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]			U200 hPa [m/s]		
		%	RMSE	5th/95th									
MAM	Tropics	31.42%	2.17	2.12	49.07%	1.61	1.56	-0.19%	3.17	3.08	37.86%	1.97	1.90
	Extra Tropics	24.71%	2.45	2.37	33.91%	2.15	2.05	-6.03%	3.45	3.34	32.03%	2.21	2.11
	Global	27.41%	2.33	2.28	39.76%	1.94	1.86	-3.64%	3.33	3.26	34.38%	2.11	2.04
		U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]			U850 hPa [m/s]		
	Tropics	32.48%	1.03	0.99	54.28%	0.69	0.68	2.17%	1.49	1.45	51.52%	0.74	0.72
	Extra Tropics	22.04%	1.17	1.13	38.08%	0.93	0.89	-0.33%	1.51	1.46	41.68%	0.88	0.84
	Global	26.57%	1.11	1.08	44.80%	0.83	0.81	0.73%	1.50	1.46	45.86%	0.82	0.79
		V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]			V200 hPa [m/s]		
	Tropics	2.30%	1.57	1.52	33.43%	1.33	1.26	1.93%	1.58	1.53	29.20%	1.14	1.10
MAM	Extra Tropics	11.50%	1.02	1.00	42.70%	0.93	0.91	-11.06%	1.28	1.25	6.88%	1.07	1.04
	Global	5.94%	1.28	1.26	37.57%	1.12	1.09	-3.45%	1.41	1.39	19.43%	1.10	1.08
		T850 hPa [C]			T850 hPa [C]			T850 hPa [C]			T850 hPa [C]		
	Tropics	1.54%	1.66	1.64	-6.19%	1.55	1.53	1.03%	1.44	1.42	0.27%	1.45	1.44
	Extra Tropics	-11.50%	1.56	1.54	3.56%	1.46	1.45	3.89%	1.46	1.45	8.90%	1.38	1.37
	Global	-4.69%	1.61	1.59	-0.67%	1.50	1.49	2.68%	1.45	1.44	5.10%	1.41	1.41
		Q975 hPa [g/kg]			Q975 hPa [g/kg]			Q975 hPa [g/kg]			Q975 hPa [g/kg]		
	Tropics	17.85%	3.48	3.41	19.55%	3.41	3.37	0.90%	4.20	4.14	23.14%	3.26	3.22
	Extra Tropics	1.40%	3.04	2.98	5.45%	2.91	2.84	-0.52%	3.10	3.04	8.15%	2.83	2.78
	Global	11.72%	3.26	3.22	14.29%	3.17	3.12	0.32%	3.68	3.64	17.57%	3.05	3.01

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26 *Table S2. As in Table 1S but for zonal wind at 200 hPa (U_{200} hPa), zonal wind at 850 hPa
27 (U_{850} hPa), meridional wind at 200 hPa (V_{200} hPa), temperature at 850 hPa (T_{850} hPa),
28 and specific humidity at 975 hPa (Q_{975} hPa).*

		DArt.M1.S0			Nu.M1.S0			DArt.M1.S.5			Nu.M1.S.5		
		U_{200} hPa [m/s]			U_{200} hPa [m/s]			U_{200} hPa [m/s]			U_{200} hPa [m/s]		
		%	RMSE	5th/95th									
SON	Tropics	11.63%	3.08	2.98	13.24%	3.03	2.86	15.53%	2.95	2.89	2.98%	3.39	3.19
	Extra Tropics	-2.03%	3.07	2.98	34.66%	1.97	1.88	9.56%	2.72	2.63	32.27%	2.04	1.96
	Global	4.59%	3.08	3.00	23.09%	2.48	2.39	12.49%	2.82	2.77	16.21%	2.70	2.58
		U_{850} hPa [m/s]			U_{850} hPa [m/s]			U_{850} hPa [m/s]			U_{850} hPa [m/s]		
SON	Tropics	29.20%	1.20	1.15	50.47%	0.84	0.81	12.35%	1.48	1.45	45.74%	0.92	0.88
	Extra Tropics	9.33%	1.33	1.28	37.85%	0.91	0.86	17.90%	1.21	1.16	43.84%	0.83	0.79
	Global	19.01%	1.27	1.24	44.06%	0.88	0.84	15.00%	1.34	1.31	44.82%	0.87	0.84
		V_{200} hPa [m/s]			V_{200} hPa [m/s]			V_{200} hPa [m/s]			V_{200} hPa [m/s]		
SON	Tropics	9.46%	1.67	1.63	34.51%	1.21	1.17	12.01%	1.62	1.59	29.24%	1.30	1.26
	Extra Tropics	17.02%	1.24	1.20	29.64%	1.05	1.00	6.88%	1.40	1.34	28.24%	1.08	1.03
	Global	12.94%	1.44	1.42	32.22%	1.12	1.09	9.55%	1.50	1.47	28.78%	1.18	1.15
		T_{850} hPa [C]			T_{850} hPa [C]			T_{850} hPa [C]			T_{850} hPa [C]		
SON	Tropics	-6.69%	1.53	1.51	-0.63%	1.44	1.43	1.60%	1.41	1.40	2.93%	1.39	1.38
	Extra Tropics	-4.91%	1.50	1.48	14.46%	1.22	1.21	6.39%	1.33	1.32	16.56%	1.19	1.18
	Global	-5.74%	1.51	1.50	7.35%	1.32	1.31	4.20%	1.37	1.36	10.15%	1.28	1.28
		Q_{975} hPa [g/kg]			Q_{975} hPa [g/kg]			Q_{975} hPa [g/kg]			Q_{975} hPa [g/kg]		
SON	Tropics	14.04%	3.92	3.85	16.68%	3.80	3.73	2.52%	4.44	4.36	14.51%	3.90	3.84
	Extra Tropics	6.78%	3.12	3.08	15.85%	2.82	2.75	4.78%	3.19	3.12	14.06%	2.88	2.81
	Global	11.48%	3.53	3.62	16.29%	3.34	3.44	3.33%	3.86	3.79	14.28%	3.42	3.36

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		DArt.M1.S0			Nu.M1.S0			Nu.M1.S.5		
		$V'V'200$ hPa [m ² /s ²]			$V'V'200$ hPa [m ² /s ²]			$V'V'200$ hPa [m ² /s ²]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
ANN	Tropics	-15.01%	17.13	16.67	-5.89%	15.77	15.39	-19.13%	17.74	17.35
	Extra Tropics	33.38%	33.29	32.61	34.74%	32.61	31.96	34.41%	32.78	32.11
	Global	29.35%	27.53	27.08	31.48%	26.7	26.27	29.83%	27.34	26.88
ANN	Tropics	-25.66%	19.79	19.21	-24.46%	19.60	18.81	-36.14%	21.44	20.77
	Extra Tropics	40.00%	23.81	23.23	38.53%	24.39	23.82	37.65%	24.74	24.09
	Global	30.02%	22.17	21.85	29.11%	22.45	22.03	26.20%	23.38	25.57
ANN	Tropics	5.56%	6.83	6.76	23.52%	5.53	5.51	24.56%	5.46	5.40
	Extra Tropics	15.02%	15.54	15.31	13.28%	15.86	15.75	13.86%	15.75	15.55
	Global	13.92%	12.45	12.29	14.35%	12.39	12.31	14.98%	12.30	12.16

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		DArt.M1.S0			Nu.M1.S0			Nu.M1.S.5		
		V'V'200 hPa [m ² /s ²]			V'V'200 hPa [m ² /s ²]			V'V'200 hPa [m ² /s ²]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
DJF	Tropics	1.74%	21.34	20.73 22.46	17.82%	17.85	17.42 18.83	10.75%	19.38	18.79 20.49
	Extra Tropics	30.22%	37.46	36.24 39.46	35.44%	34.65	33.37 36.90	34.90%	34.95	33.97 36.87
	Global	26.55%	31.55	30.77 32.99	33.28%	28.66	27.78 30.31	31.82%	29.28	28.56 30.68
		EKE200 hPa [m ² /s ²]			EKE200 hPa [m ² /s ²]			EKE200 hPa [m ² /s ²]		
DJF	Tropics	-14.99%	22.40	21.30 23.55	-18.91%	23.17	21.95 24.73	-24.14%	24.19	22.63 25.72
	Extra Tropics	36.27%	27.64	26.97 29.04	41.67%	25.30	24.26 27.03	41.62%	25.32	24.56 26.76
	Global	27.38%	25.52	25.05 26.57	30.55%	24.40	23.76 25.64	29.31%	24.84	24.10 26.01
		V'Q'850 hPa [g/kg * m/s]			V'Q'850 hPa [g/kg * m/s]			V'Q'850 hPa [g/kg * m/s]		
DJF	Tropics	10.11%	8.67	8.55 8.97	21.01%	7.62	7.56 7.89	23.08%	7.42	7.31 7.74
	Extra Tropics	13.77%	17.00	16.80 17.37	13.70%	17.01	16.97 17.29	14.18%	16.92	16.71 17.25
	Global	13.17%	13.91	13.77 14.21	14.85%	13.65	13.64 13.88	15.56%	13.53	13.40 13.80

31

		DArt.M1.S0			Nu.M1.S0			Nu.M1.S.5		
		V'V'200 hPa [m ² /s ²]			V'V'200 hPa [m ² /s ²]			V'V'200 hPa [m ² /s ²]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
JJA	Tropics	-16.18%	16.96	16.43 17.95	-10.27%	21.83	21.34 22.57	-22.96%	24.34	23.83 25.02
	Extra Tropics	25.92%	36.22	35.29 38.03	27.86%	41.12	39.97 42.76	22.21%	44.34	43.05 46.13
	Global	22.59%	29.51	28.91 30.85	23.95%	34.18	33.31 35.37	17.49%	37.08	36.16 38.46
JJA	Tropics	-25.05%	27.50	26.10 28.82	-21.13%	26.64	25.55 27.91	-26.62%	27.84	26.89 28.87
	Extra Tropics	28.41%	31.26	30.44 32.48	27.27%	31.76	30.92 33.14	20.51%	34.71	33.74 36.23
	Global	17.44%	29.70	29.14 30.56	17.55%	29.66	29.12 30.63	11.23%	31.94	31.25 32.99
JJA	Tropics	-4.77%	9.04	8.93 9.31	13.92%	7.43	7.40 7.58	13.08%	7.503	7.416 7.769
	Extra Tropics	17.55%	16.26	16.03 16.65	13.99%	16.96	16.77 17.14	12.02%	17.348	17.188 17.683
	Global	14.22%	13.52	13.38 13.82	13.98%	13.56	13.43 13.71	12.16%	13.847	13.753 14.103

32

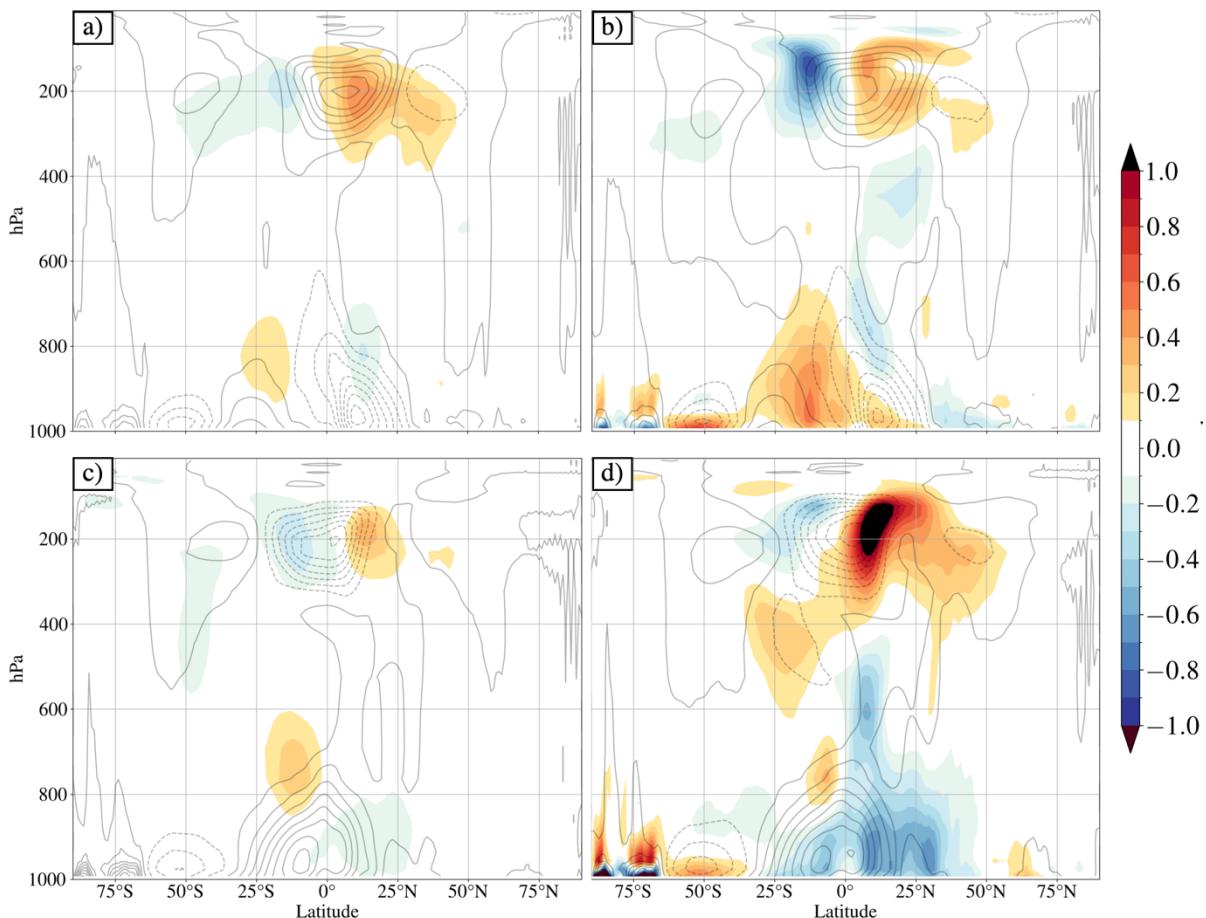
		DArt.M1.S0			Nu.M1.S0			Nu.M1.S.5		
		V'V'200 hPa [m ² /s ²]			V'V'200 hPa [m ² /s ²]			V'V'200 hPa [m ² /s ²]		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
MAM	Tropics	-16.18%	16.96	16.43 17.95	7.19%	13.55	13.22 14.53	-10.02%	16.06	15.82 16.89
	Extra Tropics			36.22	28.30%	35.05	34.08 36.89	33.94%	32.30	31.37 34.01
	Global			29.51	22.59%	27.91	27.30 29.26	30.34%	26.55	26.00 27.89
MAM	Tropics	-6.90%	17.02	16.54 17.90	16.05%	13.37	12.95 14.31	-0.85%	16.06	15.51 16.93
	Extra Tropics			27.79	29.83%	27.38	26.67 28.80	35.24%	25.65	24.90 26.95
	Global			23.76	24.96%	22.45	22.02 23.51	30.40%	22.04	21.63 22.92
MAM	Tropics			8.32	13.37%	7.51	7.45 7.72	14.16%	7.44	7.36 7.72
	Extra Tropics			16.90	11.55%	17.86	17.72 18.19	8.98%	17.39	17.23 17.71
	Global			13.78	10.22%	14.20	14.09 14.48	9.68%	13.87	13.75 14.13

		DArt.M1.S0			Nu.M1.S0			Nu.M1.S.5		
		$V'V'200 \text{ hPa} [\text{m}^2/\text{s}^2]$			$V'V'200 \text{ hPa} [\text{m}^2/\text{s}^2]$			$V'V'200 \text{ hPa} [\text{m}^2/\text{s}^2]$		
		%	RMSE	5th/95th	%	RMSE	5th/95th	%	RMSE	5th/95th
SON	Tropics	-10.53%	17.754	17.285	-16.31%	18.68	18.10	-26.50%	20.32	19.90
	Extra Tropics	30.91%	36.71	35.743	36.35%	33.82	32.79	37.66%	33.13	32.15
	Global	27.52%	30.055	29.388	31.71%	28.32	27.68	31.67%	28.33	27.68
		$EKE200 \text{ hPa} [\text{m}^2/\text{s}^2]$			$EKE200 \text{ hPa} [\text{m}^2/\text{s}^2]$			$EKE200 \text{ hPa} [\text{m}^2/\text{s}^2]$		
SON	Tropics	-16.37%	21.53	20.65	-28.13%	23.70	22.66	-34.56%	24.89	24.04
	Extra Tropics	37.39%	26.51	25.72	41.00%	24.98	24.35	40.97%	24.99	25.93
	Global	28.36%	24.49	24.01	28.51%	24.44	24.06	27.01%	24.95	24.14
		$V'Q'850 \text{ hPa} [\text{g}/\text{kg} * \text{m/s}]$			$V'Q'850 \text{ hPa} [\text{g}/\text{kg} * \text{m/s}]$			$V'Q'850 \text{ hPa} [\text{g}/\text{kg} * \text{m/s}]$		
SON	Tropics	3.86%	8.39	8.31	22.29%	6.78	6.74	22.44%	6.77	6.73
	Extra Tropics	14.44%	16.44	16.28	14.88%	16.35	16.10	14.90%	16.35	16.16
	Global	12.86%	13.46	13.36	15.89%	12.99	12.84	15.93%	12.98	12.86

33

34 *Table 3S. As in Table 2S but for the square of transient meridional flux ($V'V'200 \text{ hPa}$),*
 35 *transient kinetic energy at 200hpa (EKE200 hPa), and moisture transport by transients at*
 36 *850 hPa ($V'Q'850 \text{ hPa}$).*

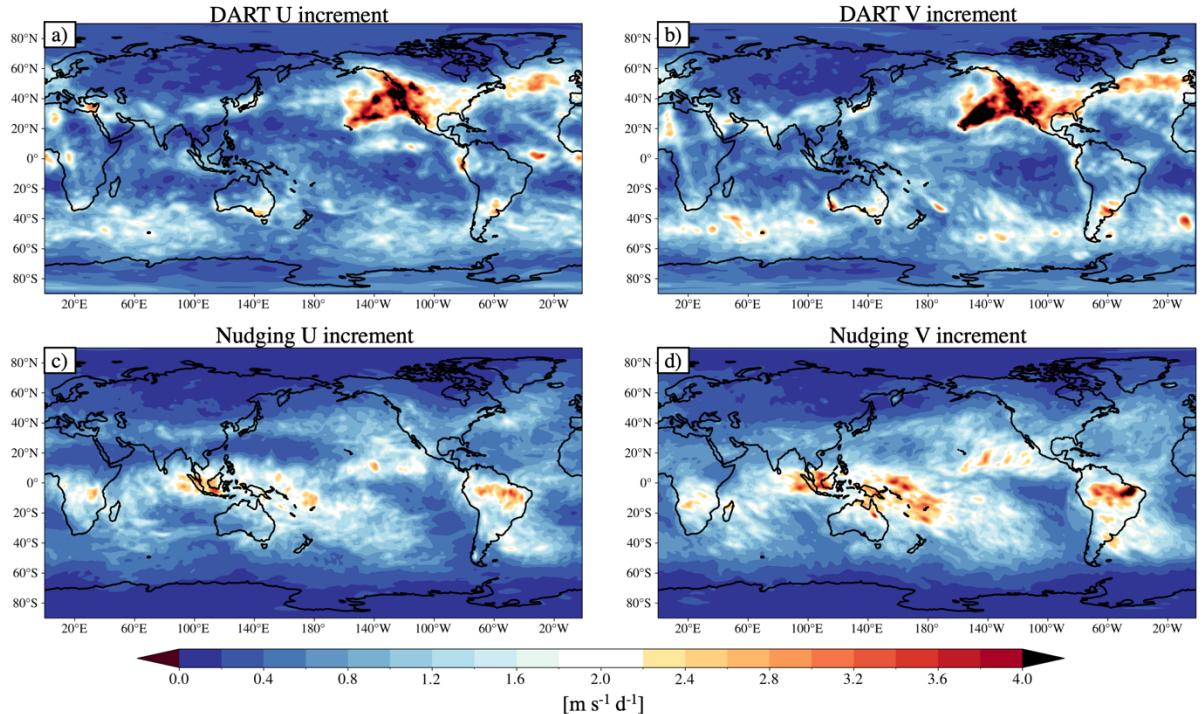
37 **Additional Figures.**



38

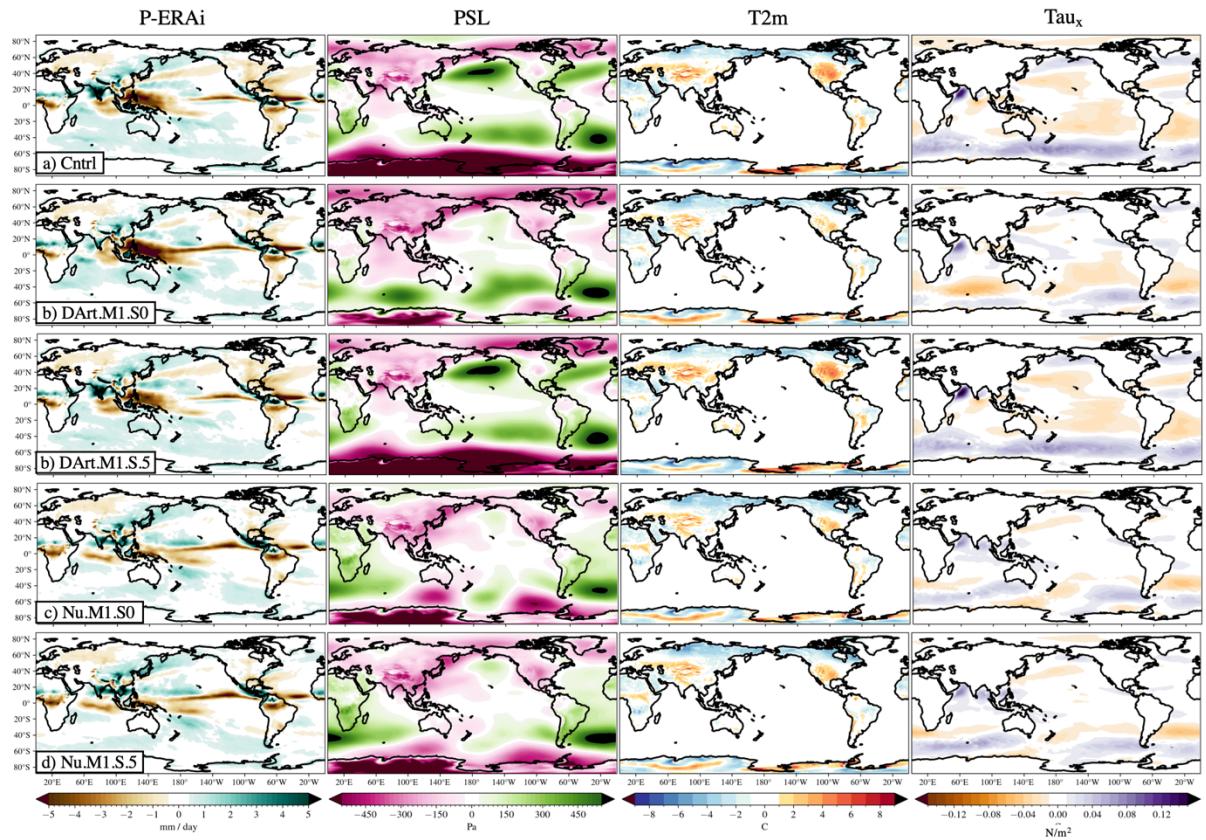
39

40 Fig S1. As in Fig 1 but for meridional wind.



41

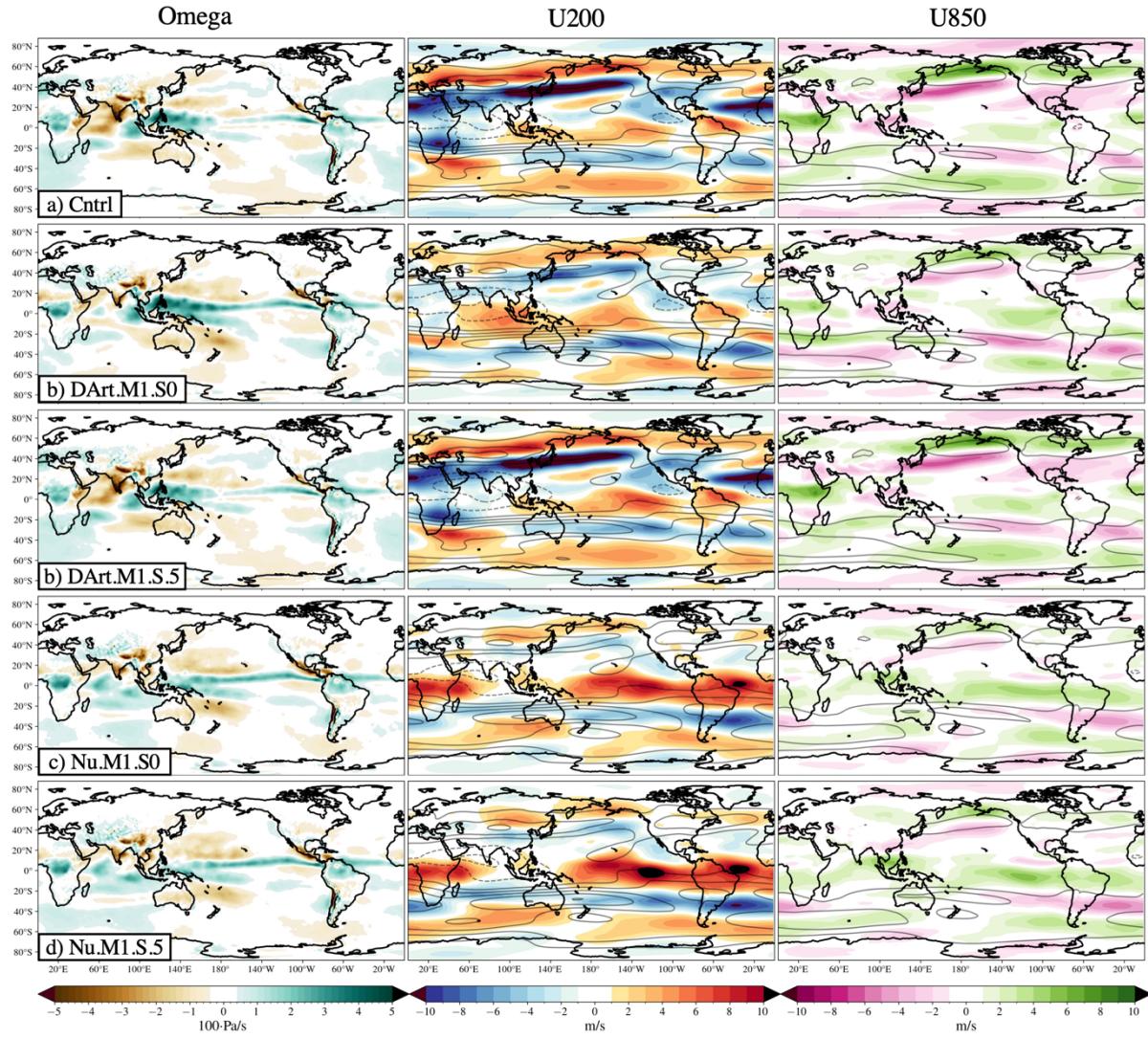
42 Fig S2. DJF variance in the U and V increment at model level 197.9 hPa in units $m s^{-1} d^{-1}$ for
 43 the DART (a, b) and Nudging (c, d) systems. At this level, the DART increments reflect the
 44 ACARS observation network see (Raeder et al., 2021, Fig. 5 and Fig 3). At lower levels they
 45 reflect the radiosonde launch sites (not shown). The nudging increment tendencies are more
 46 spatially uniform and smooth.



47

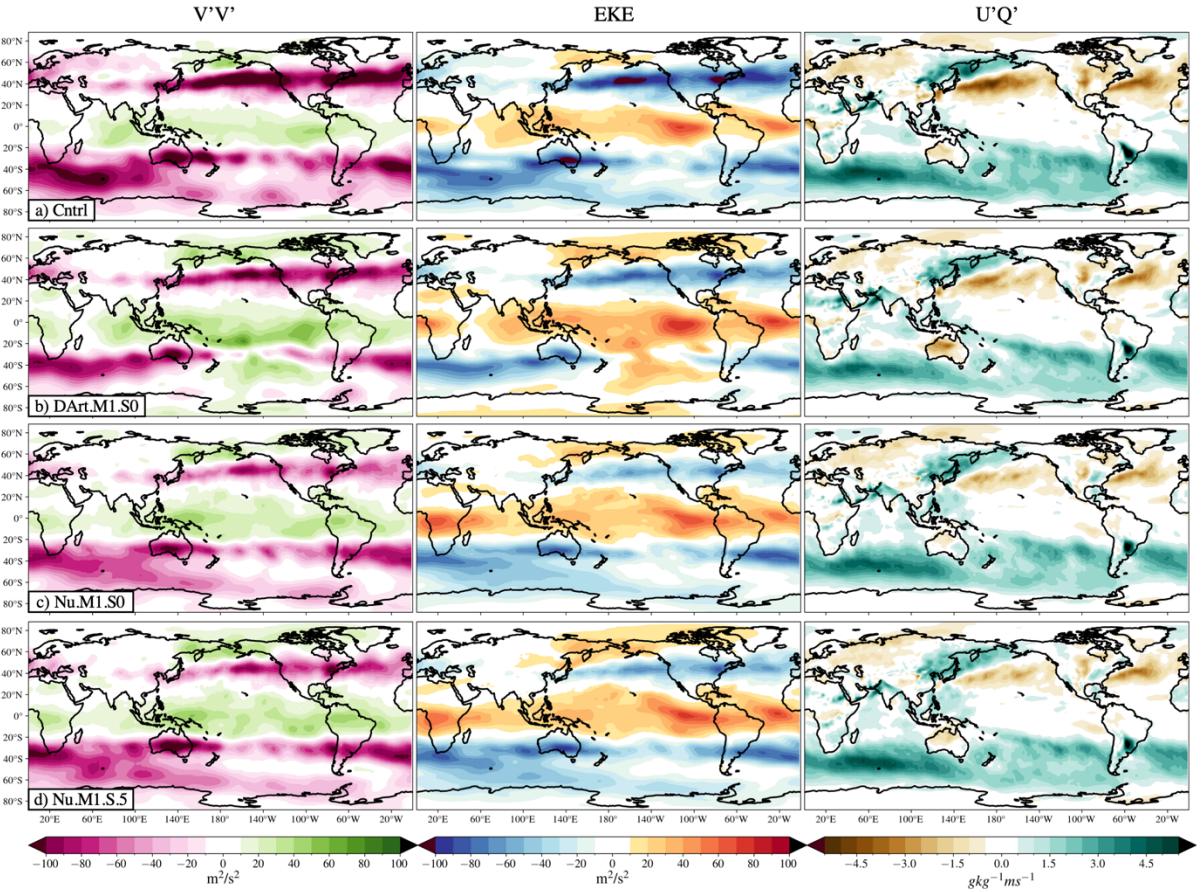
48 Fig S3. As in Fig. 5 but for JJA.

49



50

51 Fig S4. As in Fig. 6 but for JJA.



52

53 *Fig 5S. As in Fig. 7 but for JJA.*54 **Stream Function Tendency Decomposition**

55 Here we describe the computational steps to calculate the terms in equation 3 as it is
 56 notably lacking in the literature. As a reminder to the reader, equation 3 is repeated below. A
 57 jupyter notebook which completes all of the steps below can be found [here](#), and has been
 58 tested on the ERA-interim dataset:

59 https://github.com/WillyChap/MITA_SITA_CAM6/figure_notebooks/Stream_Function_Ten
 60 dency.

61

$$\frac{\partial \psi^L}{\partial t} = \sum_{i=1}^5 \xi_i + R \quad (3)$$

62

$$\xi_0 = \nabla^{-2}(-\zeta^L) = \frac{\partial \psi^L}{\partial t}$$

63

$$\xi_1 = -\nabla^{-2}\{\underline{V} \cdot \nabla \zeta^L + \zeta^L \cdot \nabla \underline{V}\}^L$$

64

$$\xi_2 = -\nabla^{-2}\{\underline{V}^L \cdot \nabla(f + \zeta^L) + (f + \zeta^L) \cdot \nabla \underline{V}^L\}^L$$

$$\begin{aligned}
65 \quad \xi_3 &= \nabla^{-2}(-\mathbf{V}_r^L \cdot \nabla \zeta^L)^L + \nabla^{-2}\{-\nabla \cdot (-\mathbf{V}_d^L \zeta^L)\}^L \\
66 \quad \xi_4 &= \nabla^{-2}(-\mathbf{V}_r^H \cdot \nabla \zeta^H)^L + \nabla^{-2}\{-\nabla \cdot (-\mathbf{V}_d^H \zeta^H)\}^L \\
67 \quad \xi_5 &= \nabla^{-2}(-\mathbf{V}_r^L \cdot \nabla \zeta^H)^L + \nabla^{-2}\{-\nabla \cdot (-\mathbf{V}_d^L \zeta^H)\}^L + \nabla^{-2}(-\mathbf{V}_r^H \cdot \nabla \zeta^L)^L \\
68 \quad &\quad + \nabla^{-2}\{-\nabla \cdot (-\mathbf{V}_d^H \zeta^L)\}^L
\end{aligned}$$

69 *Computational Steps [every step is computed such that the daily time-step is preserved (i.e.
70 there is no compositing)]:*

- 71 1. Regress out the seasonal cycle by removing the first 4 harmonics of a sin and cosine of
72 period 365.25 days and time mean (unity vector).
- 73 2. Use a fast-Fourier filter transform (FFT) to low pass filter the data to preserve signals 10
74 days in frequency or larger.
- 75 3. Compute the climatology of the U and V winds by taking a centered 90-day mean of the
76 dataset.
- 77 4. 1-10 day high frequency winds are then the raw winds at every location minus the low-
78 pass winds. 10-90 day low frequency winds are then the 10-day low pass winds minus the
79 computed climatology.
- 80 5. Compute the high/low frequency, climatological, and low-pass vorticity from their
81 respective U/V filtered winds.
- 82 6. Compute all the cross terms in equation 3. (e.g., $\underline{\mathbf{V}} \cdot \nabla \zeta^L + \zeta^L \cdot \nabla \underline{\mathbf{V}}$) and then use the
83 same low pass FFT to compute the low-frequency filtered terms.
- 84 7. Compute the divergence of the necessary terms (e.g., $-\nabla \cdot (-\mathbf{V}_d^H \zeta^H)$).
- 85 8. Multiply by -1 and take an inverse Laplacian.